

Student Name:

Student id:

Section #:

University of Bahrain
Department of Computer Science

College of Information Technology
ITCS241: Assembly Language Programming

Quiz #1: Data Representation & Architecture

SHOW DETAILED WORK on the sheet back PLEASE!!!

- 12) The binary number 10011101 is equivalent to unsigned decimal value 157 and signed decimal value -99.
- 13) In real-address mode, the logical address 49AF:C7EC is converted to the physical address 49AF0 + C7EC = 562DC.
- 14) The minimum number of bits used to represent the decimal value -160 is 9. The maximum value, in decimal, for a 25-bit signed number is $2^{24} - 1$.
- 15) In real-address mode, the max memory size is 1 MB.
In protected mode, the max memory size is 4×2^{10} MB.
- 16) The minimum number of bytes needed to represent the value "2000" is 4 bytes, and for the value 2000 is 2.
- 17) If a computer has 28 address lines and 25 data lines, the maximum size of directly addressable main memory is $2^{28} / 2^{20} = 2^8$ Mbytes.
- 18) The register used to store the starting address of the active code segment is CS. In subtracting two equal values, the Zero flag is set to 1.
- 19) In the instruction cycle, determining the operation type (add, sub, ...) is done in the DECODE step and performing the instruction's action is done in EXECUTION step.
- 20) The instruction operands may be located in many places such as in the instruction itself and MEM LOC or CPU registers (I/O port).
- 21) The 10's complement of the value -75 is 25 and the 16's complement of 3AC7D is C5383.
- 22) Using 8 bits to represent numbers, perform (16 - 41) in binary. Show all steps.

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- 1) The binary number 11001100 is equivalent to unsigned decimal value 204
and signed decimal value -52.
- 2) In real-address mode, the logical address 3A9E:A8DC is converted to the physical address
3A9E0 + A8DC = 452BC.
- 3) The minimum number of bits used to represent the decimal value -1024, is 11.
The largest signed number, in decimal, that can be stored in 16-bit is +2¹⁵-1.
- 4) Overflow may occur in adding 2 numbers if the numbers have the SAME
signs and the operation produces a result of the OPPOSITE sign.
- 5) The minimum number of bytes needed to represent the value "1024" is 4 bytes,
and the minimum number of bytes needed to represent the value 1024 is 2 bytes.
- 6) If a computer has 24 address lines and 20 data lines, the maximum size of directly addressable main
memory is 2²⁴ / 2²⁰ = 2⁴ = 16 Mbytes.
- 7) The computer components are connected using 3 types of busses: data bus, Address
and Control bus.
- 8) In the instruction cycle, determining the number of operands is done in step 2 and determining the place
to store the result is done in the Decode step.
- 9) The 9's complement of the value -294 is 705 and
the 16's complement of 56FC0 is A9040.
- 10) In real-address mode, the max memory size is 2²⁰ MB.
In protected mode, the max memory size is 4 * 2²⁰ = 2¹² MB.
- 11) Using 8 bits to represent numbers, show how the computer performs the operation (19 - 56).

$$\begin{aligned} 19 &= 00010011 \\ 56 &= 00111000 \\ -56 &= 11001000 \end{aligned}$$

$$\begin{array}{r} 00010011 \\ 11001000 + \\ \hline 11011011 \\ - 20100101 = \underline{\underline{-37}} \end{array}$$